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LAKE LABERGE FISH STILL PUZZLE SCIENTISTS

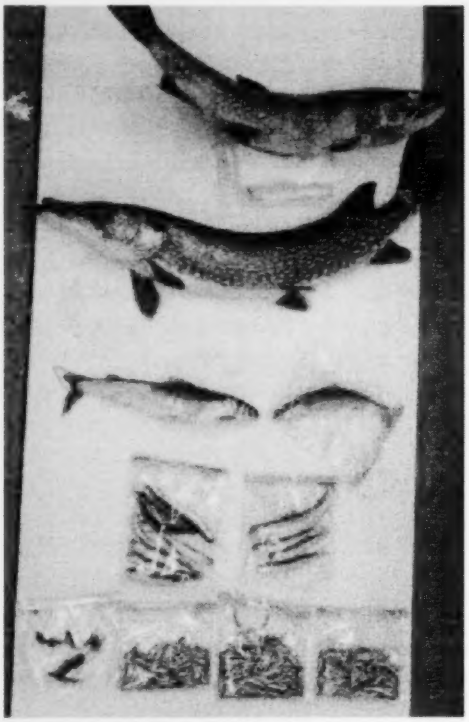
by Sarah Locke

Scientists now know a bit more about the fish in Lake Laberge, but not as much as they would like. Research results just now being published emphasize that the watery world of big and little critters living there is an exceedingly complicated one.

Scientists have been studying lake trout and other fish in the lake for the past 15 years, looking at the levels of contaminants such as DDT in their flesh. The fish are much healthier these days, but researchers still can only make educated guesses as to why.

Concerns about the fish began around 1990 when routine testing revealed surprisingly high levels of organochlorine pesticides in both lake trout and burbot. Some pesticides, such as toxaphene, were not used in the area, proving that pesticides were blowing in on the wind from other parts of the globe. This was the first Yukon evidence of long-range transport of chemicals in the atmosphere.

The contaminant levels were so high that in 1991 Health Canada issued an advisory warning people not to eat too many lake trout or any burbot livers from fish caught in Lake Laberge. The federal government also bought out the remaining commercial fishing licenses on the lake, and voluntary bans were put on sport and aboriginal fishing.



The number of fish species in Lake Laberge adds to the complexity of the ecosystem there.

(photo: Mike Ryan)

The number of lake trout had been relatively lower in Lake Laberge than in other Yukon lakes, but their numbers almost doubled over the next decade. Contaminant levels also dropped dramatically, and scientists speculated that the increase in fish numbers had something to do with the change in fish populations.

"The original theory was that if there were more fish, they would be eating lower on the food chain because of a higher level of competition for food. For example, the lake trout would eat more plankton and fewer fish, so they would be taking in fewer contaminants," says Mike Ryan, who tested this hypothesis for his doctoral study.

"The contaminant levels in 2001 were less than half of what they had been in 1992, and a drop like that is just unprecedented. Something like that does not happen

unless there is a major disturbance in the system."

Ryan thought his research would mainly be about the effects of biomagnification, explaining how contaminant loads increase as they move up the food chain. But when he defends his thesis next month at the University of Manitoba, he will not be focusing on changes in diet among Lake Laberge fish.

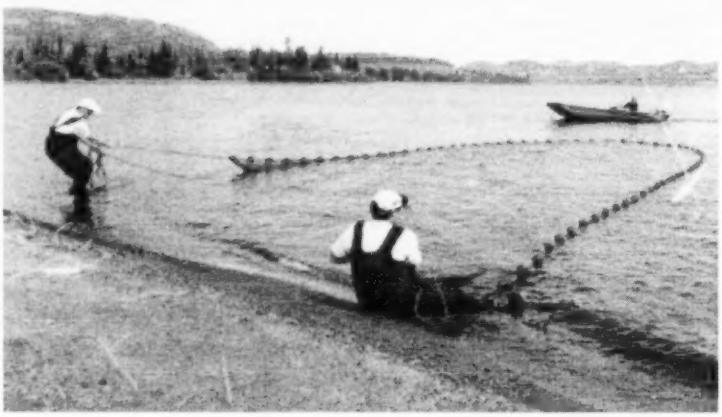
His research showed that the lake trout still prefer eating fish to plankton and maintain the same position in the food chain that they did 10 years ago. What has changed is the climate, and he now thinks that the warmer, drier weather in the 1990s set off a chain of events which helped decrease the contaminant levels.

"If you have a couple of years of warm weather, you can get distinctive changes in plankton growth in a lake. Fingerlings -- young, first year fish -- will grow faster because there is more food for them."

Ryan and other researchers now think that the phenomenon of "growth dilution" could explain why contaminant levels are lower in the fish. Basically, even if the concentration of contaminants in the environment stays about the same, a faster-growing fish eventually will have a smaller concentration of pesticides because the chemicals are diluted in its body as it grows.

"The simple analogy is that a 100-pound person who eats a one-pound bowl of cereal will get a much larger dose of cereal than a 200-pound person who eats the same one-pound bowl," explains Ryan.

While collecting and sampling fish in 2000 and 2001, the researchers concentrated on testing fish of similar weights and ages as the ones sampled in 1992. Contaminant levels can vary even among same-sized fish of different ages as older fish have longer to accumulate toxins in their flesh.



Research at Lake Laberge has shown that contaminant levels in lake trout have dropped because the fish are larger than they were a decade ago.

(photo: Mike Ryan)

Some species of plankton have declined while others have increased, and Ryan thinks these changes also could account for some of the differences in the contaminant levels, but more research would be needed to draw conclusions on this point. He says so many factors are at play, particularly in Lake Laberge, that it is difficult to tease them all apart.

"Lake Laberge has a more complex food web than many of the other Yukon lakes" he says.

The researchers studied fish in Kusawa and Quiet Lakes to help them determine whether the same forces were at work across the southern Yukon. These fish also are contaminated with organochlorine pesticides, but the levels are not as high as in the Lake Laberge fish.

"Quiet and Kusawa do not have as many species," he says "Since Lake Laberge has a more complex food web and a longer food chain, that magnifies the effects we see from plankton up to the top predators like lake trout."

DDT concentrations have dropped the most in lake trout from Laberge and Quiet Lakes, and the scientists think that this is because the fish are also leaner than they were a decade ago. Contaminants are mainly stored in fatty tissue, so a lean fish will not retain as many toxins as a fatter fish.

Ryan thinks that the fish have slimmed down because they are working harder to find food. "Seven out of ten species have increased in numbers so there are a lot more individuals in the same size body of water. That means there is more competition for resources, so the fish are burning off fat with more intense foraging," he says. "More fish also means more reproduction is occurring, so more fat is also lost during the whole mating process".

Even though the contaminant levels have dropped, at this time the health advisory is still in effect, and Ryan says that it is difficult to predict what might happen in the future.

"Everything in the ecosystem is interconnected far more than people would ever have imagined," he says.

For more information on this research, contact Mike Ryan at chessy@mts.net or Pat Roach with Indian and Northern Affairs Canada at (867) 667-3283 or roachp@ainc-inac.gc.ca.

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